Cancel the complete section for "DESCRIPTION OF THE PREFERRED EMBODIMENT"

Replace "DESCRIPTION OF THE PREFERRED EMBODIMENT" as follows:

With reference now to the drawings, and in particular to Figure 1 thereof, a new and improved tool for the removing of damaged fasteners such as nuts, bolts and studs embodying the principles and concepts of the present invention and generally designated by the reference numeral **10** will be described.

The present invention, the new and improved tool for the removal of damaged fasteners such as nuts, bolts and studs, which comprise of a plurality of tools sizes. Such components for each tool are individually configured and correlated with respect to each other so as to attain the desired objective.

More specifically, the present invention is a tool **10** of different sizes for functioning with a different size damaged and undamaged fasteners to be removed. Each tool is formed of a partly cylindrical exterior configuration **12** at the lower end **14**. The upper end **16** sides of the exterior have multiple parallel flats **18** that extend horizontally beyond the cylindrical lower end which allow

for application of a wrench or socket in the removal process. The top **20** of upper end has a square recess **22** that continues partly into the tools interior **24**. This square recess **22** is adapted to receive the end of a ratchet wrench or square driving devise in the conventional manner.

The lower end interior **14** of each socket head is fabricated with a recess **26**. Such recess is of a generally tapered configuration **28**. Such configuration includes a plurality of inverted L-shaped projections **30** and the leg's **32** of the inverted L-shaped projections is at 98 degrees and 105 degrees these projections are integral with the socket and extending radially inwardly **34**. Intermediate therebetween, the inverted L-shaped projections are a plurality of angles and radius bases **36** all of which create radially interior teeth. The edge **38** of each tooth is angularity oriented with respect to the axis **40** of the cylinder. The axial interior **42** of the recess has a smaller diameter than the axial exterior **44** of the recess.

With reference now to the drawings, and in particular to Figure 2 thereof, a new and improved tool for the removing of damaged fasteners such as nuts, bolts and studs embodying the principles and concepts of the present invention and generally designated by the reference numeral **50** will be described.

More specifically, the present invention is a tool **50** being used by and open ended wrench **52** to remove a damaged fastener **54.**

With reference now to the drawings, and in particular to Figure 3 hereof, a new and improved tool for the removing of damaged and undamaged fasteners such as nuts, bolts and studs embodying the principles and concepts of the present invention and generally designated by the reference numeral **60** will be described.

More specifically, the present invention is a tool **60** where the teeth **62** are built into the closed or box end side wrench **64** and this tool has no helix or taper in the teeth design and the apex of each tooth **66** lands at the midpoint **68** of as damaged or undamaged fastener **68** and by a rotation motion you can remove a damaged fastener and by flipping over the wrench you can tighten the damaged or undamaged fastener.

With reference now to the drawings, and in particular to Figure 4 hereof, a new and improved tool for the removing of damaged and undamaged fasteners such as nuts, bolts and studs embodying the principles and concepts of

the present invention and generally designated by the reference numeral **80** will be described.

More specifically, the present invention is a tool **80** where the teeth **82** are built into the closed or box end side of a ratcheting wrench **84** and this tool's teeth design is shown with helix and taper **86** and can be made without helix and taper in the teeth.

With reference now to the drawings, and in particular to Figure 5a, the tool **100** is shown containing an undamaged fastener **102.**

With reference now to the drawings, and in particular to Figure 5b, an undamaged fastener **110** shows a single tooth's edge **112** crossing an undamaged bolts flats **114.**

With reference now to the drawings, and in particular to Figure 5c, which is a side sectional view of a tool **120** showing where the apex of a flat **122** of the undamaged bolt fit into the tools recessed helix **124.**

In this manner, when placed over a damaged fastener, stud or nut, and counter clockwise rotated with a ratchet motion, the teeth pull the invention downwardly over the

head of the fastener and bite into its exterior surface. This will effect a coupling between the socket head and the fastener. A clockwise rotation of the tool will easily remove the fastener.

The present invention thus relates to apparatus for the removing of damaged fasteners such as studs or fasteners with rounded off interior and or exterior heads. The apparatus comprises, in combination, a socket head having a partly cylindrical external configuration with an upper end and a lower end and an axis with a first axial length there between. The socket also has a square recess on the upper end adapted to receive the end of a ratchet wrench. It also preferably has flat regions **18** in its exterior surface, either 2, 4, 6, 8, etc, for receiving a wrench or ratchet or other turning tools. The lower end of the socket head is fabricated with a major recess of a generally frustroconical configuration.

The major recess has an interior surface formed with a plurality of inverted L-shaped projections and the legs of the inverted L-shaped projections are at slight angles and depending on the fastener the angle of each tooth is 98 degrees and 105 degrees integral with the socket and extending radially inwardly from the lower end. Fabricating the teeth integral with the socket head decreases the cost of fabrication as compared with

separable teeth as exemplified by king while increasing the efficiency during use. The formation of the inverted L-shaped projections, are integral with the socket head and are different from King and the rest of the prior art and this reduces costs significantly with increasing efficiency in the use of the present invention.

The Jordan tool discloses a socket with distorted V-shaped teeth with distorted V-shaped valleys. The V-shaped valleys and the distorted teeth weaken the body and the combination of this many teeth creates a rubbing effect on the damaged fastener. We had this tool tested at the University of Florida Dept. of Engineering and this tool was proven to be weaker than the Horobec tool. Depending on the fastener the angle placement of each tooth could vary to create greater torque allowing for easier removal then the Horobec or King tool. Each of the angles has an apex with two faces of uncommon lengths. The faces of each angle are offset from the radius of the cylinder. The apex of each tooth is angularity oriented with respect to the axis of the cylinder. This arrangement of teeth allows an undamaged fastener to fit into the tool as well as damaged fasteners. When removing a damaged fastener the tool tightens and pulls down around the work-piece continually biting into the surface of a damaged fastener, when turned in one direction while allowing release when counter rotated. This is significantly different from the prior art as exemplified by King where

the work-piece must be beaten out of the socket. The axial interior of the major recess has a smaller diameter than the axial exterior of the major recess. The major recess continues through the socket head beyond the projections with a width greater than the diameter of the major recess at its axial interior. In this manner, when the socket is placed over a rounded off head of a damaged fastener, a portion thereof may extend beyond the projections. The prior art as exemplified by King has no such enlarged hole greater than the smallest diameter of the lower portion of the socket, and consequently, the prior art devices cannot remove nuts on elongated studs and does not normally accept undamaged fasteners. Further, when the socket head is rotated with a ratchet motion as in the present invention, the teeth will pull downwardly over the damaged fastener and bite into its exterior surface to effect a coupling therebetween. This allows for rotation of the socket head and associated damaged fastener to effect its removal.

The present invention is a tool for removing fasteners, studs and nuts with damaged heads. Frequently, when installing or trying to remove a fastener, stud or nut, a mechanic may chew up or round off its head, making it difficult to grab hold of the head with a conventional wrench or other tools. Studs become rusty and threads worn. Other tools might have the capability of removing the damaged fastener, but once the fastener is removed it can't

be removed from the tool easily if at all. The present invention pulls down to the base of the damaged fastener with a much greater force and the design of the angles on each leg, allows for easy removal of the damaged fastener from the tool. Also, it may be difficult to get to the damaged fastener due to a precarious location or limited amount of space. The present invention was conceived and a prototype was fabricated by the inventor to address all these problems.

The present invention is a set of sockets that fit onto standard ratchets. They are made of hardened tool steel and could be sold in many sizes. The socket of the tool has very sharp teeth that surround its inner surface.

To remove a fastener, stud or nut with a damaged head, the mechanic attaches the proper size fastener remover to the ratchet wrench, places the socket over the damaged fastener and tighten the ratchet, thus drawing the sharp teeth tighter into the damaged fastener. The damaged fastener remover pulls itself down on the damaged fastener, stud or nut, enabling the tool to grab the head securely and remove the damaged fastener. Also, the tool is able to reach hard to get at places by using different ratchet fittings and universal joints. For long studs the fastener remover would pull the stud until it reaches the base of the stud then it will bind and remove the stud.

The present invention makes it much easier to remove damaged fasteners with rounded off heads. It is a very practical and time saving tool for professional and amateur mechanics.

As to the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and

described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.